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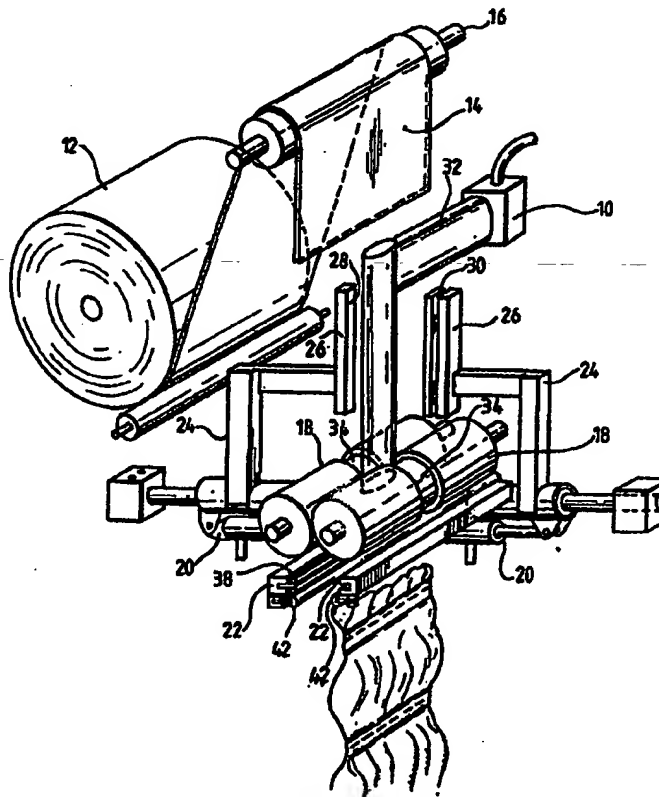
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: BAG SEALING APPARATUS

## (57) Abstract

Bag sealing apparatus comprises a compressed air source which pumps air through a supply pipe (32) towards an opening in a bag. Bag material (14) is advanced by rollers (18) from a roll (12). The material is in the form of two layers open at one side. The supply pipe extends between the layers through the open side and the open side is sealed by heat sealing by two side members (26). Each of the rollers defines a circumferential recess (34) and the two recesses together receive the supply pipe. The apparatus further comprises heat sealing elements (36) for sealing the opening in the bag and spring mounted clamp parts (42) for clamping the bag downstream of the sealing elements to reduce fluid back pressure from the downstream bag.



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BAG SEALING APPARATUS

The invention relates to bag sealing apparatus.

5 It is known to produce air bags, or air pillows, for use in packaging goods to protect them. Thus, a delicate article might be surrounded with air pillows in a cardboard box to protect it from damage during transport. It is known to make such air pillows from  
10 heat sealable plastics material and the bags are produced in a strip with each bag being heat sealed from the next. The known sealing method is unreliable however as the back pressure from air in the bag as it is being sealed tends to unseal the bag.

15 According to one aspect of the invention there is provided bag sealing apparatus comprising a fluid source to pump fluid towards an opening in a bag, means for sealing the opening in the bag and means for  
20 clamping the bag downstream of the sealing means to reduce fluid back pressure.

In this way, as the bag is clamped downstream of the sealing means, the back pressure does not operate on  
25 the seal and a good seal can be reliably ensured. Also the quantity of fluid introduced into the bag can be closely controlled as fluid cannot escape past the

clamping means during sealing.

The fluid source may be a source of compressed gas, preferably compressed air.

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The sealing means may seal the bag in any suitable way, such as by adhesive or mechanical means, but preferably the sealing means comprises heat sealing means.

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The clamping means may comprise a resilient member which is urged against the bag. The resiliency aids in providing a fluid tight seal. Preferably, the clamping means comprises two resilient clamping members arranged on opposite sides to clamp a bag between them.

15

Preferably, the clamping means is arranged to clamp the bag before the sealing means starts to seal the bag.

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The clamping means and sealing means may be mounted separately, but in one embodiment, a clamping member of the clamping means and a sealing member of the sealing means are mounted together on a mounting member. Preferably, on the mounting member, the clamping member is resiliently mounted ahead of the

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sealing member so as to engage the bag before the sealing member. This ensures that the bag is clamped before the sealing operation commences. Preferably, a second mounting member is provided which mounts a second clamping member and/or a second sealing member. Conveniently, only one of the first and second mounting members is movable, but in another embodiment both of the first and second mounting members may be movable towards and away from each other. The or each mounting member is preferably moved pneumatically.

The fluid source may be arranged to pump fluid through a fluid supply pipe.

The apparatus may be arranged to operate in a cycle. The material for the bag may be provided as a strip which is advanced by advancing means through the apparatus.

The means for advancing the bag material may take any suitable form and preferably comprises two rollers side by side between which the material passes. Preferably, at least one of the rollers includes a circumferential recess and the recess or both recesses together receive the supply pipe.

The bag material may be in the form of two layers open

at one side and the fluid supply pipe may extend between the layers through the open side. Means is preferably provided for sealing the open side.

5 According to another aspect of the invention there is provided apparatus for making a bag comprising means for advancing material for making a bag from a store, the material being in the form of two layers open at one side, a supply pipe extending between the layers  
10 through the open side and means for sealing the open side.

This arrangement allows the bag to be filled directly and without complication.

15 The material may be open at both sides but preferably is open on only one side. The open side of the material is preferably sealed upstream of the end of the supply pipe. The side sealing means may take any  
20 suitable form and may comprise heat sealing means. The side sealing means preferably comprises a member which is movable towards and away from the side of the material. The apparatus preferably includes bag sealing means for sealing the bag after the bag has  
25 been filled from the supply pipe. The bag sealing means preferably lies downstream of the advancing means. The bag sealing means preferably includes a

member which is movable towards and away from the material. The bag sealing means and the side sealing means are preferably rigidly connected and moved together. The bag sealing means member and/or the side sealing means member may be moved by pneumatic means.

The means for advancing the bag material may take any suitable form and preferably comprises two rollers side by side between which the material passes. Preferably, at least one of the rollers includes a circumferential recess and the recess or both recesses together receive the supply pipe.

According to a further aspect of the invention there is provided apparatus for making a bag comprising a compressed fluid supply pipe and two rollers arranged side by side and between which material for making a bag passes, one or both of the rollers including a circumferential recess and the recess or both recesses together receiving the supply pipe.

In this way the amount of fluid entering the bag can be precisely controlled as backflow past the rollers is limited. Preferably the supply pipe substantially fills the recess or both recesses. The bag material may be provided as a strip. Preferably bag sealing



means is provided immediately past the rollers. Thus,  
the bag sealing will leave only a minimal amount of  
fluid between the seal and the rollers. Preferably  
clamping means is provided for clamping a bag  
5 downstream of the sealing means to reduce fluid back  
pressure.

Two embodiments of the invention will now be described  
by way of example and with reference to the  
10 accompanying drawings, in which:

Fig. 1 is a perspective view of the apparatus of  
the first embodiment;

Fig. 2 is a detail side elevation of the heat  
15 sealing part of the apparatus of Fig. 1; and,

Fig. 3 is the view of Fig. 2 of the second  
embodiment.

Fig. 1 shows the apparatus 10 of the first embodiment.  
20 A roll of bag material 12 is stored on a spindle and  
material 14 from the roll passes over an upper roller  
16 and downwardly between two advancing rollers 18  
which grip the material and are driven by a motor (not  
shown) to advance the material in steps. The material  
25 is in two layers with a fold on one side and being  
open at the other side.

A pneumatic source powers two pistons 20 provided beneath the advancing rollers 18. At the inner end of each piston 20 is connected a bag sealing member 22 parallel to and beneath one of the advancing rollers 18. The outer end of each piston 20 is connected to an arm 24 which extends upwardly past the advancing rollers 18 and inwardly to mount an upright side member 26. One side member 26 includes a heating element 28 and the other side member 26 mounts a sprung mounted part 30. A compressed air supply pipe 32 extends inwardly parallel to the advancing rollers 18 so as to lie between two layers of the material 14 centrally thereof and turns to extend downwardly past the upright members 26 to the advancing rollers 18. Each advancing roller 18 includes a central circumferential recess 34 such that the material and the end of the supply pipe 32 can be received in the recesses 34. The end of the supply pipe 32 does not extend downwardly past the plane containing the axes of the advancing rollers 18.

The bag members 22 are shown in detail in Fig. 2. One of the bag members 22 mounts two vertically spaced heating elements 36. The other bag member 22 carries two spring mounted parts 38 opposite the heating elements 36. Between the spring mounted parts 38 is provided a serrated blade 40. Below the heating

elements 36, the bag member 22 mounts a projection 42 with a resilient end and a similar projection 42 with a resilient end is spring mounted in an oppositely disposed position on the other bag member 22. These parts are arranged such that when the piston 20 operates to bring the bag members 22 together, the clamping projections 42 will engage first followed by the heating elements 36 and the spring mounted parts 38 followed by the serrated knife 40 engaging the bag.

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In use then, the motor which drives the advancing rollers advances in steps. Once the rollers 18 have been advanced and stopped the pistons 20 are operated and the upright elements 26 are brought together at the open side of the material 14. Current is applied to the heating element 28 to heat seal the edges of the material which is urged against the heating element 28 by the spring mounted part 30. At the same time, the members 22 are brought together. As the members 22 are brought together, the clamping projections engage the bag material to close it off and the spring mounted parts 38 then urge the material against the heating elements 36 to heat seal the material in two vertically spaced positions. The serrated knife 40 then engages the bag to perforate between the two seals. The pistons 20 are then operated to retract the members 22 and arms 24 and the

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advancing rollers 18 are advanced again while compressed air is supplied through the pipe 32. When the cycle has been repeated, the first bag has been created. The bags are created in a strip and can be  
5 torn off at the perforated line created by the knife 40.

It is seen that the clamping projections act to close off the area being sealed by the heating element 36  
10 from back pressure from the bag which has just been formed so that the seals which are created are not subjected to that pressure until the seals have been formed and cooled to some degree. In this way a seal is reliably formed.

15 The supply pipe 32 and the recesses 34 in the rollers 18 are sized and spaced in relation to the thickness of the bag material 14 such that little or no air can escape backwards between the supply pipe 32 and the  
20 rollers 18 and thus the amount of air supplied to each bag can be controlled precisely and a uniform series of bags produced.

The supply pipe may supply compressed air at 3psi.  
25 The bag material may be any suitable heat sealable material which provides an air barrier and may be low density polyethylene (LDPE), for example. The sealing

contact time may be 1.5 seconds.

The second embodiment is shown in Fig. 3 and is similar to the embodiment of Figs. 1 and 2. Only the differences from the first embodiment will be described and the same reference numerals will be used for equivalent features.

The only difference in the second embodiment is that the projections 42 are not provided on the bag members 22 but instead are provided on separately operated rams (not shown). This enables greater and independent control over the delay between bag clamping and bag sealing and cutting. It also makes the heating elements 36 easier to change.

CLAIMS

1. Bag sealing apparatus comprising a fluid source to pump fluid towards an opening in a bag, means for sealing the opening in the bag and means for clamping the bag downstream of the sealing means to reduce fluid back pressure.
2. Apparatus as claimed in claim 1, wherein the fluid source is a source of compressed air.
3. Apparatus as claimed in claim 1 or claim 2, wherein the sealing means comprises heat sealing means.
4. Apparatus as claimed in claim 1, 2 or 3, wherein the clamping means comprises a resilient member which is urged against the bag.
5. Apparatus as claimed in claim 4, wherein the clamping means comprises two resilient clamping members arranged on opposite sides to clamp a bag between them.
6. Apparatus as claimed in any preceding claim, wherein the clamping means is arranged to clamp the bag before the sealing means starts to seal the bag.

7. Apparatus as claimed in any preceding claim, wherein a clamping member of the clamping means and a sealing member of the sealing means are mounted together on a mounting member.

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8. Apparatus as claimed in claim 7, wherein on the mounting member, the clamping member is resiliently mounted ahead of the sealing member so as to engage the bag before the sealing member.

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9. Apparatus as claimed in claim 7 or claim 8, wherein a second mounting member is provided which mounts one of a second clamping member and a second sealing member.

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10. Apparatus as claimed in claim 9, wherein only one of the first and second mounting members is movable.

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11. Apparatus as claimed in claim 9, wherein both of the first and second mounting members are movable towards and away from each other.

25

12. Apparatus as claimed in any of claims 7 to 11, wherein the or each mounting member is moved pneumatically.

13. Apparatus as claimed in any preceding claim, wherein the apparatus is arranged to operate in a cycle.

5 14. Apparatus as claimed in claim 13, wherein the material for the bag is provided as a strip which is advanced by advancing means through the apparatus.

10 15. Apparatus as claimed in claim 14, wherein the means advancing the bag material comprises two rollers side-by-side between which the material passes.

15 16. Apparatus as claimed in claim 15, wherein the fluid source is arranged to pump fluid through a fluid supply pipe.

20 17. Apparatus as claimed in claim 16, wherein at least one of the rollers includes a circumferential recess and the recess or both recesses together receive the supply pipe.

25 18. Apparatus as claimed in any preceding claim, wherein a fluid supply pipe is provided and the bag material is in the form of two layers open at one side, the fluid supply pipe extending between the layers through the open side.



19. Apparatus as claimed in claim 18, wherein means is provided for sealing the open side.

20. Apparatus for making a bag comprising means  
5 for advancing material for making a bag from a store, the material being in the form of two layers open at one side, a supply pipe extending between the layers through the open side and means for sealing the open side.

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21. Apparatus as claimed in claim 20, wherein the material is open on only one side.

22. Apparatus as claimed in claim 20 or claim  
15 21, wherein the open side of the material is sealed by side sealing means upstream of the end of the supply pipe.

23. Apparatus as claimed in claim 22, wherein  
20 the side sealing means comprises heat sealing means.

24. Apparatus as claimed in claim 22 or claim  
23, wherein the side sealing means comprises a member which is movable towards and away from the side of the  
25 material.

25. Apparatus as claimed in any of claims 20 to

24, wherein the apparatus includes bag sealing means for sealing the bag after the bag has been filled from the supply pipe.

5        26.        Apparatus as claimed in claim 25, wherein the bag sealing means lies downstream of the advancing means.

10       27.        Apparatus as claimed in claim 25 or claim 26, wherein the bag sealing means includes a member which is movable towards and away from the material.

15       28.        Apparatus as claimed in claim 25, 26 or 27, wherein side sealing means is provided for sealing the open side of the material upstream of the end of the supply pipe and the bag sealing means and the side sealing means are rigidly connected and movable together.

20       29.        Apparatus as claimed in claim 28, wherein the bag sealing means and the side sealing means are movable by pneumatic means.

25       30.        Apparatus as claimed in any of claims 28 to 29, wherein the means for advancing the bag material comprises two rollers side-by-side between which the material passes.

31. Apparatus as claimed in claim 30, wherein at least one of the rollers includes a circumferential recess and the recess or both recesses together receive the supply pipe.

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32. Apparatus for making a bag comprising a compressed fluid supply pipe and two rollers arranged side by side and between which material for making a bag passes, one or both of the rollers including a circumferential recess and the recess or both recesses together receiving the supply pipe.

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33. Apparatus as claimed in claim 32, wherein the supply pipe substantially fills the recess or both recesses.

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34. Apparatus as claimed in claim 32 or claim 33, wherein the bag material is provided as a strip.

35. Apparatus as claimed in claim 32, 33 or 34, wherein bag sealing means is provided immediately downstream of the rollers.

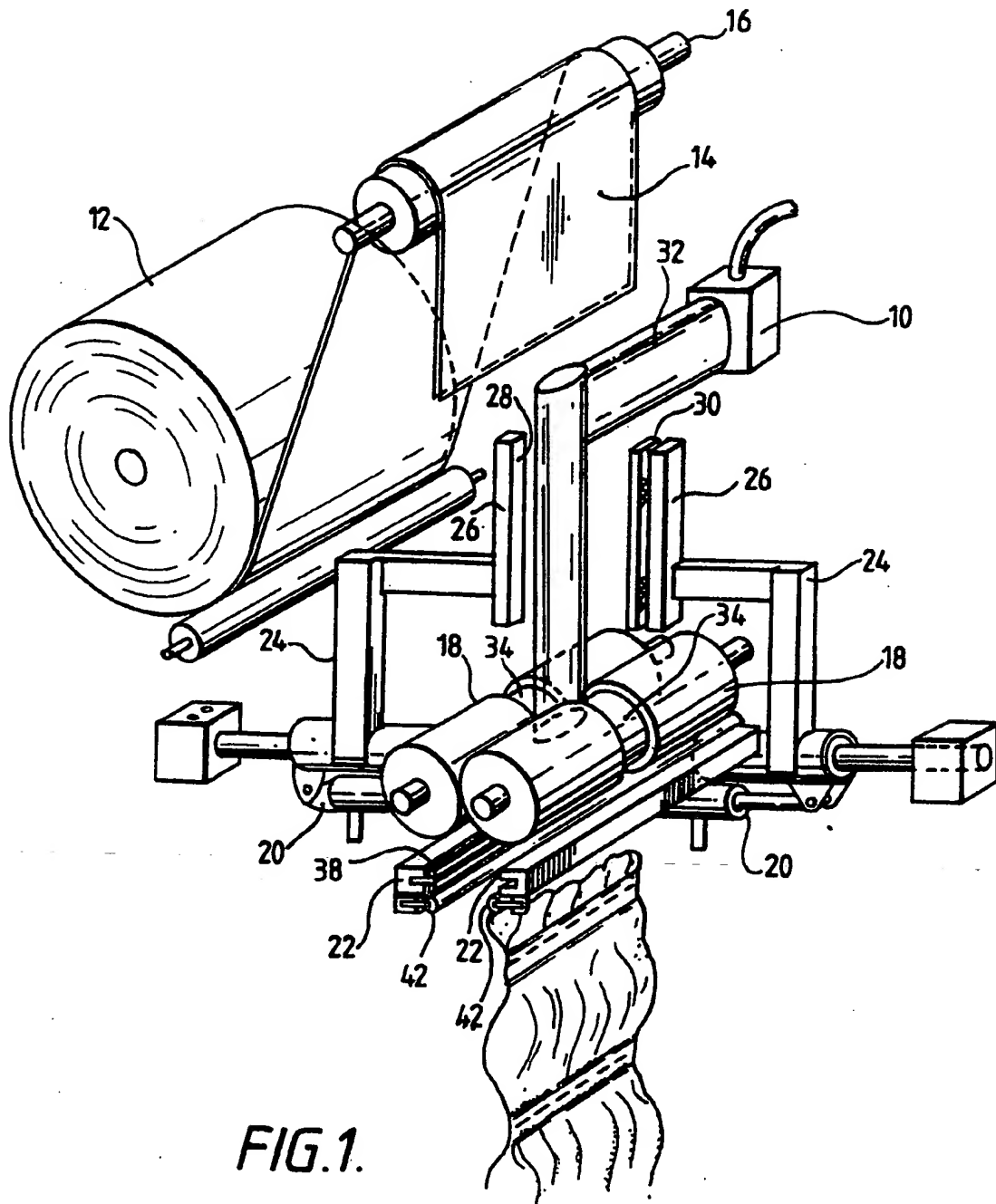
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36. Apparatus as claimed in claim 35, wherein clamping means is provided for clamping a bag downstream of the sealing means.

25

37. Apparatus substantially as described herein with reference to Figs. 1 and 2 or Fig. 3 of the accompanying drawings.

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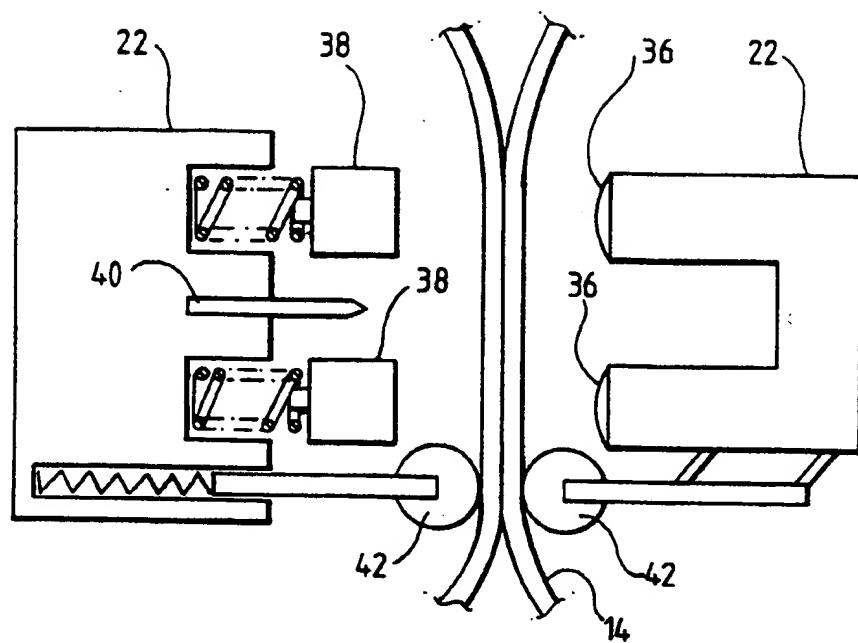


FIG. 2.

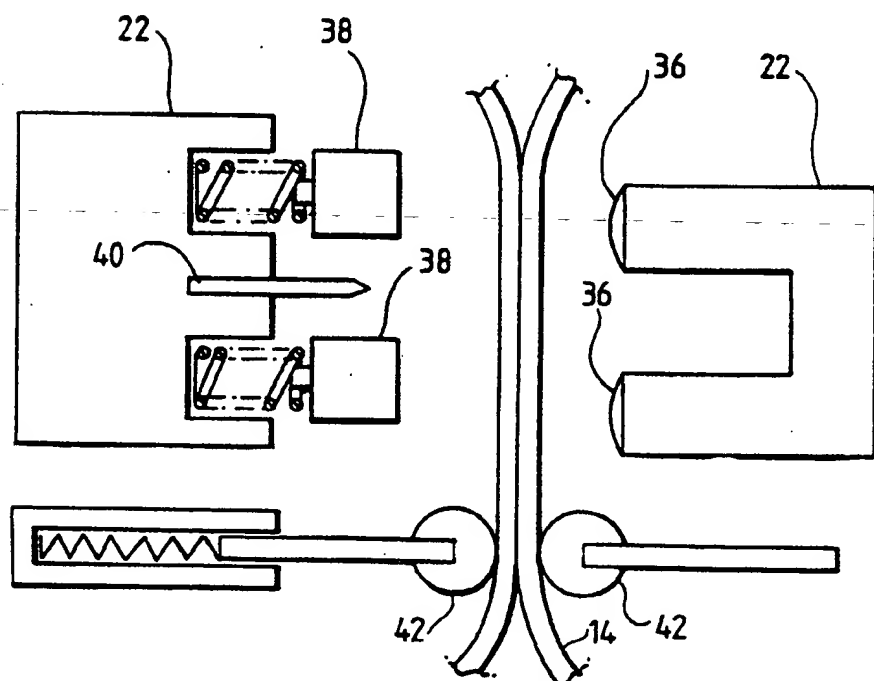


FIG. 3.

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## INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 95/00205

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 6 B65B51/30 B65B9/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X  Y A	EP,A,0 381 400 (DU PONT CANADA) 8 August 1990 see page 6, line 13 - page 8, line 57; figures	1,3-7,9, 11,18-21
X  A	US,A,5 231 817 (J. SADLER) 3 August 1993  see column 3, line 51 - column 6, line 8; figures	8,12,13 14,16, 23-27, 34,36
	---	1,3-5,7, 9,11, 18-21,30
	---	14-16, 23-27, 32,34-36
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☒ Further documents are listed in the continuation of box C.

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP,A,0 350 617 (W. KLINKEL) 17 January 1990 see column 12, line 14 - column 15, line 46; figure 4	8,12
A	---	29
Y	EP,A,0 368 095 (ROVEMA) 16 May 1990 see column 5, line 42 - column 7, line 29; figures	13
A	--- EP,A,0 276 628 (ILAPAK) 3 August 1988 -----	



